

DSC-02002

REMARKS

Claims 1-38 are pending in the present application. Claims 1, 11, 16, 25, 29, 32, 36 have been amended, leaving Claims 1 - 38 for consideration upon entry of the present Amendment.

Claim rejections under 35 U.S.C. § 102

Claims 32 - 35 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 4,253,428 to Billings et al. Applicants respectfully traverse this rejection.

Independent Claim 32 as amended is directed to a method for delivering liquid hydrogen and capturing gaseous hydrogen from the same storage tank comprising, *inter alia*, “a liquid hydrogen storage tank, said storage tanking including a liquid outlet and a gas outlet”; and “a hydrogen conversion device fluidly connected to and arranged to receive gas from.”

Billings et al. teaches of a system for storing hydrogen using metal hydrides and burning gaseous hydrogen released from the hydride tanks. Examiner states in the rejection of Claims 32 – 35 that pressure relief valve 62 is used being used with hydrogen tanks having a liquid coming out to pump 134. Applicant respectfully disagrees with Examiners reading of Billings et al. Examiner’s attention is directed to Column 3, lines 41 – 54 of Billings et al. where it expressly states that the valves 66, 70 are manually operated to feed gas from line 34 *into* hydride storage tanks 74,78 (column 3, line 45). Accordingly, Applicants respectfully assert that it would be impossible to capture hydrogen gas *from* the storage tank taught by Billings as described in Claim 32 of the present application as Examiner suggests. Applicant respectfully submits that in order for Billings et al. to anticipate Claim 32, gas flow described by Billings et al. would need to travel in the opposite direction. Clearly this is contrary to the teachings of Billings et al. Additionally, Examiner states that pump 134 of Billings et al. pumps liquid hydrogen from the top of tanks 66, 70, Applicants respectfully disagree. Column 3, line 53-54 expressly states that the hydride material is heated to release *hydrogen gas*.

Applicants respectfully submit that independent Claim 32, as amended is not anticipated, nor is obvious in view of Billings et al. In Claim 32, Applicants claim requires a tank having both a *liquid and gas outlet*. Additionally, Claim 32 requires that a hydrogen conversion device be arranged to *receive* gas from the tank gas outlet.

DSC-02002

As discussed above, in contrast to Applicants' Claim 32, Billings et al. teaches a storage tank having a gas outlet and a gas inlet. Therefore, Applicants submit that Claim 32 patentably defines over Billings et al.. Moreover, Claims 33-35 also patentably define over Billings et al. as depending directly or indirectly from independent Claim 32 and incorporating all the limitations of independent Claim 32. Accordingly, reconsideration and allowance of claims 32-35 are respectfully requested.

Claim rejections under 35 U.S.C. § 103(a)

Claims 1, 4, 7-10, 11, 13, 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 6,365,289 to Lee et al.

Peschka teaches a system for storing liquid hydrogen and recovering evaporated hydrogen gas from a storage tank and providing the hydrogen gas to a fuel cell. The fuel cell provides electrical power to a cooling unit which in turn provides additional cooling to the liquid hydrogen tank. Peschka also provides for a means of charging a battery for energy storage.

Lee et al. teaches a cogeneration system using a fuel cell where heat is captured and converted using a Rankine cycle. In Lee et al., hydrogen gas is provided to a fuel cell which generates both electricity and thermal heat. The heat is captured from the fuel cell by a liquid coolant that is then further heated in a boiler (column 4, lines 56-60). Gaseous coolant is separated from liquid coolant in an accumulator and then passed into an expander which produces shaft work (column 5, lines 7-9).

Applicants respectfully submit that independent Claim 1, as amended is not anticipated, nor is obvious in view of Peschka in further view of Lee et al. In Claim 1, Applicants claim requires that hydrogen gas be captured from a liquid hydrogen storage tank, stored in a second tank and then used as fuel in a hydrogen storage device to generate electricity. Additionally, Claim 1 requires that the captured gas be vented from the second storage tank in the event that the gas pressure exceeds a threshold.

In contrast to independent Claim 1, Applicants respectfully submit that the combination of Peschka with Lee et al., would not have the limitations required by independent Claim 1. Namely, the combination of these references would, at best, provide for a system where heat is captured from the fuel cell of Peschka and used in a

DSC-02002

Rankine cycle to drive an expander to produce shaft work. In Examiners rejection, Examiner states that the output of the fuel cell in Lee et al is directed to a superheater to drive an expander, Applicant respectfully disagrees. Examiner is respectfully directed to Column 5, lines 7-8 where Lee et al. expressly states that it is "gaseous cooling fluid" which drives the expander, not hydrogen gas captured from a storage tank as required by independent Claim 1. Therefore, Applicants submit that Claim 1 patentably defines over Peschka in view of Lee et al. Accordingly, reconsideration and allowance of Claim 1 is respectfully requested.

Claim 4 which depends directly from independent Claim 1 and incorporates all the limitations of Claim 1 further requires that the hydrogen conversion device be an expansion engine. As discussed above in the discussion on Claim 1, the expansion device of Lee et al. is coupled to a cooling system for the fuel cell. In order for a claim to be obvious in light of prior art references, there must be some suggestion or incentive to combine the references. Accordingly, as discussed above, the combination of Peschka and Lee et al., at best would result in the use of an expander driven by heat produced from a fuel cell. Therefore, Applicants respectfully submit that there is no motivation to combine Peschka and Lee et al. in the manner proscribed by Claim 4. Therefore, Applicants submit that Claim 4 patentably defines over Peschka in view of Lee et al. Accordingly, reconsideration and allowance of Claim 4 is respectfully requested.

Applicants respectfully submit that independent Claim 11, as amended, is not anticipated, nor is obvious in view of Peschka in further view of Lee et al. In Claim 11, Applicants require that hydrogen gas be captured from a liquid hydrogen tank; stored in a second tank and used to operate a hydrogen conversion device. For reasons set forth above with respect to Claims 1 and 4, Applicants respectfully submit that neither Peschka nor Lee et al. teach or suggest the method of generating electricity as claimed in Claim 11. Applicants respectfully submit that the combination of Peschka and Lee et al., at best would result in the use of an expander driven by heat produced from a fuel cell. Therefore, Applicants submit that Claim 11 patentably defines over Peschka in view of Lee et al. Accordingly, reconsideration and allowance of Claim 11 is respectfully requested.

Claim 13 which depends directly from independent Claim 12 and incorporates all the limitations of Claim 21 further requires that the hydrogen conversion device be an

DSC-02002

expansion engine. As discussed above in the discussion on Claims 1 and 11, the expansion device of Lee et al. is coupled to a cooling system for the fuel cell. In order for a claim to be obvious in light of prior art references, there must be some suggestion or incentive to combine the references. Accordingly, as discussed above, the combination of Peschka and Lee et al., at best would result in the use of an expander driven by heat produced from a fuel cell. Therefore, Applicant respectfully submits that there is no motivation to combine Peschka and Lee et al. in the manner proscribed by Claim 13. Therefore, Applicants submit that Claim 13 patentably defines over Peschka in view of Lee et al. Accordingly, reconsideration and allowance of Claim 13 is respectfully requested.

Applicants respectfully submit that independent Claim 25, as amended, is not anticipated, nor is obvious in view of Peschka in further view of Lee et al. In Claim 25, Applicants' Claim 25 requires that hydrogen gas be captured from a liquid hydrogen tank; stored in a second tank and used to rotate an expansion engine and fuel a operate a hydrogen conversion device. For reasons set forth above with respect to Claims 1, 4 and 11, Applicant respectfully submits that neither Peschka or Lee et al. teach or suggest the method of generating electricity using captured hydrogen gas to rotate an expansion engine and fuel a hydrogen conversion device as claimed in Claim 25. Applicants respectfully submit that the combination of Peschka and Lee et al., at best, would result in the use of an expander driven by heat produced from a fuel cell. Therefore, Applicants submit that Claim 25 patentably defines over Peschka in view of Lee et al. Accordingly, reconsideration and allowance of Claim 25 is respectfully requested.

Claims 36-38 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 6,365,289 to Lee et al. in further view of U.S. Patent 4,253,428 to Billings et al. Applicants respectfully submit that independent Claim 25, as amended, is not anticipated, nor is obvious in view of Peschka in further view of Lee et al. in further view of Billings et al. For the same reasons set forth above with respect to independent Claims 1, 11, 25, and 32 Applicants respectfully submit that the rejections of Claims 36-38 are also improper. Applicant respectfully submits that Billings et al., does not teach, suggest a system that would operate in the manner suggested in Examiner's rejection as described above with respect to Claim 32. Additionally, none of the cited references teaches or suggests the storage of hydrogen in a

DSC-02002

second tank. Therefore, Applicants submit that Claims 36-38 patentably define over Peschka in view of Lee et al. in further view of Billings et al. Accordingly, reconsideration and allowance of Claims 36- 38 is respectfully requested.

Claims 2 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 6,365,289 to Lee et al. in further view of U.S. Patent 5,375,580 to Stolz et al. Claim 2 which depends directly from independent Claim 1 and incorporates all the limitations of Claim 1 further requires that the hydrogen conversion device be an internal combustion engine. For the reasons set forth above with respect to Claim 1, Applicants respectfully submit the neither Peschka, Lee et al., nor Stolz et al. teach or suggest a method for generating electricity as claimed in Claim 2. Applicants respectfully submit that, at best, if Peschka is combined with Lee et al and Stolz et al., the internal combustion engine taught by Stolz. et al. would be fueled directly by the liquid hydrogen from Peschka. Therefore, Applicants submit that Claim 2 patentably defines over Peschka in view of Lee et al. in view of Stolz et al. Accordingly, reconsideration and allowance of Claim 2 is respectfully requested.

Claim 12 which depends directly from independent Claim 11 and incorporates all the limitations of Claim 11 further requires that the hydrogen conversion device be an internal combustion engine. For the reasons set forth above with respect to Claim 1 and 11, Applicant respectfully submits that neither Peschka, Lee et al., nor Stolz et al. teach or suggest a method for generating electricity as claimed in Claim 12. Applicants respectfully submit that, at best, if Peschka is combined with Lee et al and Stolz et al., the internal combustion engine taught by Stolz. et al. would be fueled directly by the liquid hydrogen from Peschka. Therefore, Applicants submit that Claim 12 patentably defines over Peschka in view of Lee et al. in view of Stolz et al. Accordingly, reconsideration and allowance of Claim 12 is respectfully requested.

Claims 3, 5-6 and 14-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 6,365,289 to Lee et al. in further view of U.S. Patent 6,543,229 to Johansson.

Claims 3 and 5-6 which depend directly or indirectly from independent Claim 1 and incorporates all the limitations of Claim 1 further require additional limitations. For the reasons set forth with respect to Claim 1, Applicants respectfully submit that neither Peschka, Lee et al., nor Johansson teach or suggest a method of generating electricity as

DSC-02002

provided in dependent Claims 3 and 5-6. Applicants respectfully submit that Peschka, Lee et al., and Johansson were combined, at best, the heat produced by the Stirling engine of Johansson would be captured and used with an expander of Lee et al. Dependent Claims 3 and 5-6 which depend directly or indirectly from independent Claim 1 and incorporate the limitations of Claim 1 additionally require that the captured hydrogen gas be stored prior to fueling the hydrogen conversion device. Therefore, Applicants submit that Claims 3 and 5-6 patentably define over Peschka in view of Lee et al. in view of Johansson. Accordingly, reconsideration and allowance of Claims 3, 5-6 is respectfully requested.

Claims 14-15 which depend directly or indirectly from independent Claim 11 and incorporate all the limitations of Claim 11 further require additional limitations. For the reasons set forth with respect to Claim 1 3, 5-6 and 11, Applicants respectfully submit that neither Peschka, Lee et al., nor Johansson teach or suggest a method of generating electricity as provided in dependent Claims 14-15. Therefore, Applicants submit that Claims 14-15 patentably define over Peschka in view of Lee et al. in view of Johansson. Accordingly, reconsideration and allowance of Claims 14-15 is respectfully requested.

Claims 16-17, 22-27 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 6,365,289 to Lee et al. in further view of U.S. Patent 4,910,962 to Vanzo.

Applicants respectfully submit that independent Claim 16, as amended, is not anticipated, nor is obvious in view of Peschka in view of Lee et al. in further view of Vanzo. Applicants' Claim 16 requires that the liquid hydrogen storage tank have a pressure relief valve and that the hydrogen conversion device be located downstream from said relief valve. Neither Peschka, Lee et al., nor Vanzo teach or suggest a pressure relief valve connected to the storage tank and having a hydrogen conversion device downstream from the relief valve. While Peschka does teach of a pressure relief valve, this relief valve vents to the atmosphere (column 2, lines 13-14) and there is no suggestion or teaching of a hydrogen conversion device downstream of a relief valve as required by Claim 16. Therefore, Applicants submit that Claim 16 patentably defines over Peschka in view of Lee et al. in view of Vanzo. Accordingly, reconsideration and allowance of Claim 16 is respectfully requested.

DSC-02002

Claims 17 and 22-24 which depend directly or indirectly from independent Claim 16 and incorporate all the limitations of Claim 16 further require additional limitations not found in the independent claim. For reasons set forth above with respect to Claim 16, Applicants respectfully submit that neither Peschka, Lee et al., nor Vanzo teach or suggest the electrical generator system as claimed in Claims 17 and 22-24. Therefore, Applicants submit that Claim 17 and 22-24 patentably define over Peschka in view of Lee et al. in view of Vanzo. Accordingly, reconsideration and allowance of Claims 17 and 22-24 is respectfully requested.

Applicants respectfully submit that independent Claim 25, as amended, is not anticipated, nor is obvious in view of Peschka view of Lee et al. in further view of Vanzo. Applicants Claim 25 requires that the captured hydrogen gas be stored in a second tank, in addition, the captured hydrogen gas is used to rotate an expansion engine and fuel a hydrogen conversion device. Applicants respectfully submit that neither Peschka, Lee et al., nor Vanzo teach or suggest the electrical generator system where the captured hydrogen gas is used to rotate an expansion engine and fuel a hydrogen conversion device as claimed in Claim 25. Therefore, Applicants submit that Claim 25 patentably defines over Peschka in view of Lee et al. in view of Vanzo. Accordingly, reconsideration and allowance of Claims 25 is respectfully requested.

Claims 26-27 which depend directly or indirectly from independent Claim 25 and incorporate all the limitations of Claim 25 further require additional limitations not found in the independent claim. For reasons set forth above with respect to Claim 25, Applicant respectfully submits that neither Peschka, Lee et al. nor Vanzo teach or suggest the electrical generator system as claimed in Claims 26-27. Therefore, Applicants submit that Claim 26-27 patentably defines over Peschka in view of Lee et al. in view of Vanzo. Accordingly, reconsideration and allowance of Claims 26-27 is respectfully requested.

Applicants respectfully submit that independent Claim 29, as amended, is not anticipated, nor is obvious in view of Peschka view of Lee et al. in further view of Vanzo. Applicants' Claim 29 requires that a pressure relief valve be connected to the liquid hydrogen storage tank and the hydrogen conversion device be fluidly connected to the relief valve opposite the liquid storage tank. For the reasons set forth above with respect to Claim 16, Applicants respectfully submit that neither Peschka, Lee et al., nor Vanzo teach or suggest the electrical generator system having a hydrogen conversion device

DSC-02002

connected to a relief valve opposite a liquid hydrogen storage tank as claimed in Claim 29. Therefore, Applicants submit that Claim 29 patentably defines over Peschka in view of Lee et al. in view of Vanzo. Accordingly, reconsideration and allowance of Claims 29 is respectfully requested.

Claims 18-19, 30-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 4,910,962 to Vanzo in further view of U.S. Patent 5,375,580 to Stolz et al.

Claims 18-19 which depend indirectly from independent Claim 16 and incorporate all the limitations of Claim 16 further require additional limitations not found in the independent claim. For reasons set forth above with respect to Claim 16, Applicant respectfully submits that neither Peschka, Vanzo nor Stolz et al. teach or suggest the electrical generator system as claimed in Claims 18-19. Therefore, Applicants submit that Claim 18-19 patentably defines over Peschka in view of Vanzo in view of Stolz et al. Accordingly, reconsideration and allowance of Claims 18-19 is respectfully requested.

Claims 30-31 which depend directly or indirectly from independent Claim 29 and incorporate all the limitations of Claim 29 further require additional limitations not found in the independent claim. For reasons set forth above with respect to Claim 29, Applicant respectfully submits that neither Peschka, Vanzo, nor Stolz et al. teach or suggest the electrical generator system as claimed in Claims 30-31. Therefore, Applicants submit that Claim 30-31 patentably defines over Peschka in view of in view of Vanzo in further view Stolz et al. Accordingly, reconsideration and allowance of Claims 30-31 is respectfully requested.

Claims 20-21, 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,386,309 to Peschka in view of U.S. Patent 4,910,962 to Vanzo in further view of U.S. Patent 6,543,229 to Johansson.

Claims 20-21 which depend indirectly from independent Claim 16 and incorporate all the limitations of Claim 16 further require additional limitations not found in the independent claim. For reasons set forth above with respect to Claim 16, Applicants respectfully submit that neither Peschka, Vanzo nor Johansson teach or suggest the electrical generator system as claimed in Claims 20-21. Therefore, Applicants submit that Claim 20-21 patentably defines over Peschka in view of Vanzo in

DSC-02002

view of Johansson. Accordingly, reconsideration and allowance of Claims 20-21 is respectfully requested.

Claim 28 which depends indirectly from independent Claim 25 and incorporates all the limitations of Claim 25 further require additional limitations not found in the independent claim. For reasons set forth above with respect to Claim 25, Applicants respectfully submit that neither Peschka, Vanzo nor Johansson teach or suggest the electrical generator system as claimed in Claims 28. Therefore, Applicants submit that Claim 28 patentably defines over Peschka in view of Vanzo in view of Johansson. Accordingly, reconsideration and allowance of Claims 28 is respectfully requested.

Conclusion

For at least the foregoing reasons advanced above, Applicants respectfully request withdrawal of these rejections. It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly reconsideration and allowance is earnestly requested.

The Commissioner is hereby authorized to charge any additional fees which may be required for this amendment, or credit any overpayment, to Deposit Account 503125.

In the event that an extension of time is required, or may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of to Deposit Account No. 503125.

Respectfully submitted,

By: 
Dave S. Christensen
Registration No. 40,955

Date: January 18, 2005
Address: 10 Technology Drive, Wallingford, CT 06492
Telephone: 203-678-2122
Facsimile: 203-678-2276
Customer No.: 31661